

PATENT CLAIMS

1. A method for generating steam, in particular
ultrapure steam, by introducing a fuel and an oxidizing
5 agent in a stoichiometric ratio into a reaction zone
and exothermically reacting them, transferring the hot
reaction gases formed into an evaporation zone,
introducing water in liquid and/or vapor form into the
evaporation zone, the water which is introduced being
10 evaporated and/or superheated as it mixes with the hot
reaction gases, characterized in that the steam-
containing reaction mixture undergoes catalytic
afterburning.
- 15 2. The method as claimed in claim 1, characterized in
that the steam-containing reaction mixture flows
through a gas-permeable structure with a catalytically
active surface.
- 20 3. The method as claimed in claim 2, characterized in
that the gas-permeable structure is a foamed metallic
or ceramic material.
4. The method as claimed in claim 2, characterized in
25 that the catalytically active surface is platinum.
5. The method as claimed in claim 1, characterized in
that the steam-containing reaction mixture leaves the
evaporation zone via a throttle point and is
30 accelerated as it does so.
6. The method as claimed in claim 5, characterized in
that the reaction mixture is accelerated to the speed
of sound.
- 35 7. The method as claimed in claim 1, characterized in
that the oxidizing agent is oxygen.

8. The method as claimed in claim 1, characterized in that the oxidizing agent is hydrogen peroxide.

9. The method as claimed in claim 1, characterized in
5 that the fuel is hydrogen.

10. The method as claimed in claim 1, characterized in that the fuel is a hydrocarbon.

10 11. The method as claimed in claim 8, characterized in that the fuel is natural gas.

12. The use of the method as claimed in one of claims 1-9 for generating ultrapure steam with a steam content
15 of at least 99.9% by weight, a temperature of up to 2000 K and a pressure of up to 30 bar.

13. The use of the method as claimed in one of claims 1-11 for generating steam as working medium in an
20 energy conversion process which is free of CO₂ emissions.

14. The use of the method as claimed in one of claims 1-11 for generating steam for treating special waste.
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15. A steam generator for generating steam, in particular ultrapure steam, substantially comprising a combustion and evaporation chamber (2) having a reaction zone (14) for the exothermic reaction of a
30 fuel and an oxidizing agent, and having an evaporation zone (15) for the evaporation and/or superheating of an injected quantity of water, a device for feeding the fuel (4) and the oxidizing agent (5) into the reaction zone (14), an ignition device (1) for igniting at least
35 some of the fuel/oxidizing agent mixture, a device (12) for feeding water (6) into the evaporation zone (15), and an outlet nozzle (7) for the steam-containing reaction mixture, characterized in that a catalytic

afterburning chamber (3) is arranged downstream of the reaction and evaporation chamber (2).

5 16. The steam generator as claimed in claim 15, characterized in that the catalytic afterburning chamber (3) is designed as a housing (20), the free cross section of flow (21) of which is acted on over a region of its axial length by a through-flow body (16) with a catalytically active surface.

10 17. The steam generator as claimed in claim 16, characterized in that the flow passage (21) of the afterburning chamber (3) is of substantially cylindrical design.

15 18. The steam generator as claimed in claim 17, characterized in that the housing (20) is designed as a double-casing tube.

20 19. The steam generator as claimed in claim 18, characterized in that the housing (20) of the afterburning chamber (3) is air-cooled.

25 20. The steam generator as claimed in claim 16, characterized in that the through-flow body (16) is based on a foamed metal material or on a foamed ceramic material.

30 21. The steam generator as claimed in claim 16, characterized in that the through-flow body (16) is based on a metallic or ceramic honeycomb structure.

35 22. The steam generator as claimed in claim 16, characterized in that a gas-analysis device (22) is arranged downstream of the through-flow body.

23. The steam generator as claimed in claim 22, characterized in that a lambda sensor (22) is arranged inside the flow passage (21).

5 24. The steam generator as claimed in claim 22, characterized in that the housing of the afterburning chamber (3) has a through-opening for a removal pipe (23), which removal pipe (23) is designed to be gas-permeable toward the flow passage (21) and outside
10 the housing (20) is in communication, via a pressure-relief device (24), with a chamber (25) which accommodates a gas-analysis device, in particular a lambda sensor (22).